

### **REMARKS**

Applicants request reconsideration of the above-identified application in view of the following remarks.

Claims 39, 42 and 43 are pending in the present application.

Applicants acknowledge, with appreciation, the Examiner's withdrawal of objections not reiterated in the present Office Action, including the rejections under 35 U.S.C. §§ 102 (b) and (e).

Claims 39, 42 and 43 stand rejected under 35 U.S.C. § 103(a), as being unpatentable over Staley, *Comp. Usage Mater. Educ. Proc. Symp.*, 113-122 (1985), ("Staley"), with support from Lesk and Hardman, *Methods in Enzymology*, Vol. 115: pp. 381-390 (1985), ("Lesk"). Claims 39, 42 and 43 also stand rejected under 35 U.S.C. § 103(a) as being unpatentable over United States patent 5,581,476 ("Osslund"), and as being unpatentable over Staley, in view of United States patent 6,340,459 ("Yellin"). Applicants traverse and maintain, for all the reasons detailed in their March 2, 2004 Reply to Office Action, that the structure coordinates recited in the claims should be considered functional descriptive material and be afforded patentable weight.

Applicants respond to each of the rejections below.

#### **1. The Pending Claims are Not Obvious over Staley, in View of Lesk**

Applicants incorporate by reference the arguments set forth in their March 2, 2004 Reply to Office Action and make the following additional points. The Examiner states that Staley teaches a computer with memory and display, wherein the computer comprises instructions for displaying a three-dimensional representation of a molecule using structure coordinates (pp. 113 and 118-119). The Examiner contends

that the structure coordinates recited claims 39, 42 and 43 do not functionally interact with the computer or the program stored therein because these coordinates do not structurally or functionally change the computer or the program. For these reasons, the Examiner concludes that the structure coordinates are nonfunctional descriptive material, and as such, they are not entitled to patentable weight against Staley.

In the October 2, 2003 Office Action, the Examiner supplied applicants with only the abstract for Staley. The current Office Action included the complete article. Upon review of that article it is apparent that, contrary to the present invention, Staley does not teach or disclose three-dimensional graphical representations of *atomic* crystal structures using coordinates. Staley merely draws three-dimensional representations of the geometry of *molecular* crystals. That is, Staley relates to a computer for producing the three-dimensional representation of the “space lattice” or geometric “crystal system” of a physical crystal. Staley does not provide a computer to produce the three-dimensional atomic representation of any protein molecule, including CD40L protein.

Even if Staley did provide a computer for producing a three-dimensional representation of a protein, which it does not, the claimed invention involves functional descriptive material that is entitled to patentable weight: the structure coordinates of CD40L protein. With or without support from Lesk, Staley does not disclose or suggest a computer comprising applicants’ structure coordinates for producing the three-dimensional representations recited in the pending claims. Accordingly, the claimed computers are not obvious over those documents.

In response to applicants’ argument that *In re Gulack*, 703 F.2d 1381, 217 USPQ 401 (Fed. Cir. 1983) is of no consequence, the Examiner maintains that MPEP §§ 2106.IV.B.1(b) and 2106.VI rest, in part, on the analysis and decision of the

*Gulack* case. The Examiner states that the digits on the ring in *Gulack* were determined to be functional descriptive material, as these digits functionally interacted with the substrate and the particular sequence of digits was not suggested by the prior art. The Examiner contends that applicants' claimed computer is different because it can produce a three-dimensional representation of the binding site of *any* protein for which structure coordinates are known.

The Examiner appears to have misinterpreted applicants' argument that *Gulack* is of no consequence to the present invention. Applicants believe that *Gulack* involves a mathematical device, which, on its face, is distinct from the computers claimed herein. See, e.g., *In re Lowry*, 32 F.3d 1579, 1582, 32 USPQ2d 1031, 1034 (Fed. Cir. 1994) ("[T]he printed matter cases have no factual relevance where 'the invention as defined by the claims *requires* that the information be processed not by the mind but by a machine, the computer'" (citing *In re Bernhart*, 417 F.2d 1395, 1399, 163 USPQ 611, 615 (CCPA 1969))).

Applicants also argued that the *Gulack* Court held there to be a functional relationship between the printed digits and the ring such that the printed matter must be accorded patentable weight. Applicants believe that *Gulack* supports the patentability of the pending claims. More particularly, a functional relationship exists between applicants' claimed computers and the data stored therein, because those computers convert novel structure coordinates into a display of a novel three-dimensional representation of a binding site, molecule or molecular complex of CD40L protein. Such display could not be accomplished without the novel structural data and the ability of the computer to convert that data into said novel three-dimensional representation.

The Examiner also asserts that Lesk supports that a computer program for producing a three-dimensional representation of proteins can be used with any known set of structure coordinates. The Examiner further asserts that Lesk does not teach that the computer or program is changed in any way upon reading of the structure coordinates.

The Examiner appears to have misinterpreted Lesk. In order to generate the graphical representation (or picture) of the protein in Lesk, the program uses two input files to prepare “transformations of coordinates into picture elements” (page 383). *See also* Lesk, pp. 384-385. In fact, the computer in Lesk creates a new set of coordinates, which is “extracted” and “computed” from the initial atomic coordinates (page 384). Lesk emphasizes that graphics are “integrated” into the operation of computer programs. Hence, Lesk supports applicants’ position that the structure coordinates are functional material, which is interrelated and integrated into the claimed computer. Nevertheless, Lesk does not disclose or suggest applicants’ structure coordinates.

Moreover, applicants maintain that the claimed computers are “special purpose” computers. The Examiner appears to be convinced by applicants’ arguments that the claimed computers are distinct from a “general purpose” computer. However, the Examiner asserts that Staley is also directed to a “special purpose” computer, which comprises instructions for producing a three-dimensional representation of proteins. The Examiner further asserts that since the present claims do not recite any particular algorithm to produce a three-dimensional representation, they do not distinguish from the computers of Staley.

As discussed above, Staley is not directed to a computer for producing a three-dimensional representation of any protein. Even if Staley were directed to

such a computer, applicants reiterate that the claimed invention provides a special purpose computer – one that displays a three-dimensional representation not previously displayed, because applicants were the first to disclose the novel structure coordinates of CD40L protein necessary to do so. *See, e.g., In re Alappat*, 33 F.3d 1526, 1545, 31 USPQ2d 1545, 1558 (Fed. Cir. 1994) (“[A] general purpose computer in effect becomes a special purpose computer once it is programmed to perform particular functions pursuant to instructions from program software”(internal citations omitted)).

In sum, Staley does not provide a computer to produce the three-dimensional atomic representation of any protein molecule. And, even if Staley did, the claimed invention includes functional descriptive material, i.e., structure coordinates of CD40L protein, that is entitled to patentable weight. With or without support from Lesk, Staley simply does not disclose or suggest a computer comprising applicants’ structure coordinates for producing the three-dimensional representations recited in the pending claims.

## **2. The Pending Claims are Not Obvious over Osslund**

Applicants incorporate by reference the arguments made in their March 2, 2004 Reply to Office Action and make the following additional points. The Examiner states that Osslund teaches a Silicon Graphics 320 VGX computer comprising a display screen, wherein the computer comprises a program for displaying a three-dimensional representation of a molecule using crystal coordinates (column 6, line 23 to column 7, line 2). The Examiner asserts that the structure coordinates are nonfunctional descriptive material, and as such, are not entitled to patentable weight and do not distinguish the claimed invention from Osslund. The Examiner contends that Osslund specifically teaches that different coordinates may be

input into a known and/or commercially available computer program in order to produce a three-dimensional representation of a protein, and Osslund's computer may be used with any set of coordinates to produce a three-dimensional representation of a protein. The Examiner concludes that Osslund teaches a "special purpose" computer which renders obvious the claimed invention.

Once again, the Examiner contends that the digits on the ring in *Gulack* were determined to be functional descriptive material, as those digits "functionally interacted with the substrate and as the particular sequence of digits and the deviation thereof were not suggested by prior art". However, using the same reasoning, the particular sequence and spatial arrangement of atoms built into the structure coordinate file of the claimed invention was not known in the prior art. The sequence of numbers in *Gulack* are equivalent to the arrangement of atoms in structure coordinates. Only when the particular arrangement of atoms (sequence of digits) and the deviation thereof is used, can a three-dimensional representation of a novel three-dimensional representation of a binding site, molecule or molecular complex of CD40L be produced. Therefore, as in *Gulack*, the present invention is claimed in terms of functional descriptive material. Applicants' computers are not obvious over Osslund, because Osslund's computer does not comprise the structure coordinates of CD40L protein necessary for displaying a three-dimensional representation of the binding site of CD40.

### **3. The Pending Claims are Not Obvious over Staley in view of Yellin**

Applicants incorporate by reference the arguments made in their March 2, 2004 Reply to Office Action and make the following additional points. The Examiner contends that Staley teaches a computer for three-dimensional display of crystal structures, comprising a computer readable medium (memory) and a monitor

(screen). The Examiner further contends that while Staley does not teach that its memory comprises the coordinates recited in the pending claims, Yellin teaches structural coordinates for residues 116-261 of human CD40L protein (Figure 17 and column 5) and teaches that such coordinates may be input into a known computer program and modeled using computer modeling software (column 11, lines 33-56).

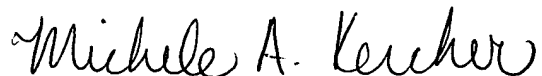
The Examiner contends that it would be obvious to one of ordinary skill in the art at the time of the invention to have included structure coordinates for residues 116-261 of human CD40L protein, as taught by Yellin, in the computer readable medium in the computer of Staley where the motivation would have been to use Staley's computer and program to project a three-dimensional representation of a putative receptor binding site of CD40L, as suggested by the tertiary structures and three-dimensional alignments taught by Peitsch, et al., *International Immunity*, 5: 233-238 (1993) ("Peitsch") and the computer modeling of Yellin. The Examiner further asserts that one skilled in the art would reasonably have expected success in including the structure coordinates for residues 116-261 of human CD40L protein in the computer readable medium and computer of Staley because Yellin teaches the structure coordinates for CD40L protein were known and could be used for three-dimensional representation, and Staley teaches that his computer can be used to visualize and display three-dimensional representations of crystallized molecules.

Staley cannot be combined with Yellin, because the structure coordinates of Yellin do not constitute prior art to the pending claims. Yellin is not prior art because it was filed after applicants filed their priority application. Yellin was filed as application No. 08/637,323 on April 22, 1996 as a continuation-in-part of application No. 08/567,391, filed on December 1, 1995, now abandoned, and a continuation-in-part of application No. 08/566,258, filed December 1, 1995, now

abandoned. Applicants had already filed the priority application to the present invention, United States Serial No. 60/000,448 on June 22, 1995, by the earliest filing date for the Yellin, December 1, 1995. That priority application fully discloses the structure coordinates of this invention. Therefore, the structure coordinates for CD40L protein were not known before the present invention and could not be used for producing three-dimensional representation. Moreover, claims 39 and 43 recite binding sites for CD40 derived from the structure of CD40L. These binding sites were not disclosed in Yellin. Accordingly, Staley, which does not provide a computer to produce the three-dimensional atomic representation of any protein molecule, in combination with Yellin, which is not prior art, does not render obvious the pending claims.

For all the reasons detailed above, none of Staley, Lesk or Osslund teach or suggest the computers of the present claims. Applicants request reconsideration and allowance of claims 39, 42 and 43 in view of the foregoing remarks.

Respectfully submitted,



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